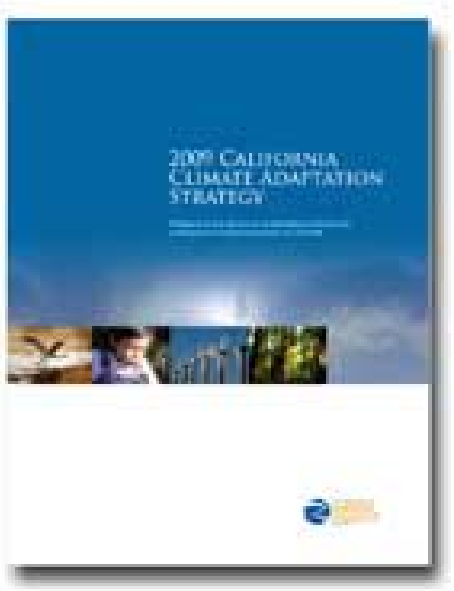
Climate Adaptation Decision Support Tools

Focus: Cal-adapt and Draft Climate Adaptation Policy Guide - Public Stakeholder Input Meetings

May 14-18, 2012

Kurt Malchow
California Natural Resources Agency

Bridging the Gap Between State and Local Planning:



Research synthesis

Local Adaptation Planning

First step: make the research easier to understand

(2009 CAS Executive Summary Strategy #12)

Cal-adapt (cal-adapt.org/):

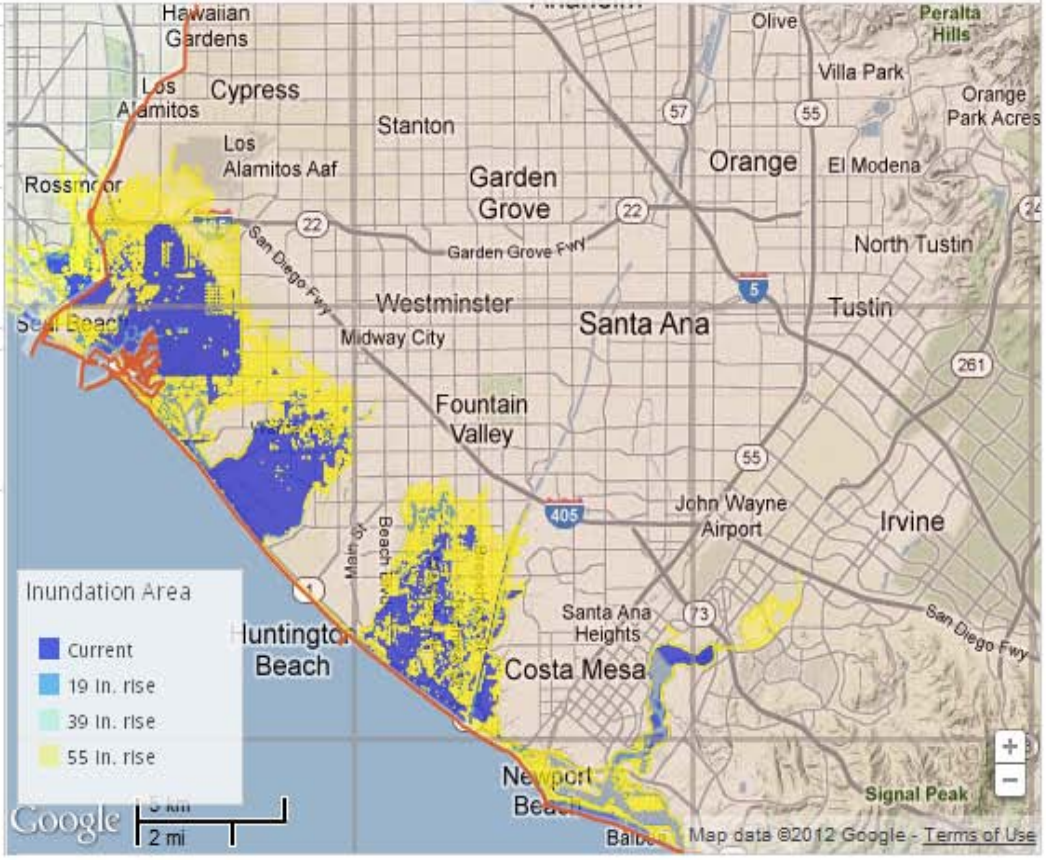
LOCAL CLIMATE SNAPSHOTS

Orange County, CA

Use Metric Units

Sea Level Rise

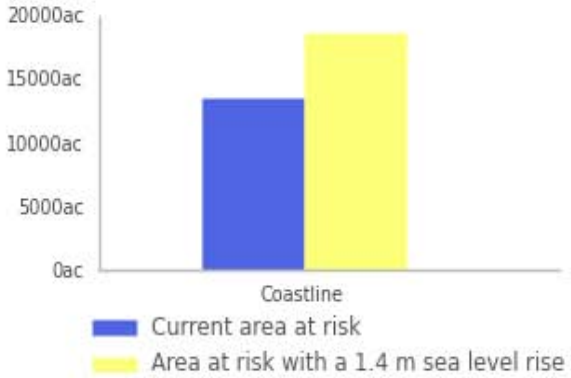
Areas vulnerable to a 100-year flood event as sea level rises



ORANGE COUNTY

Land Vulnerable to a 100-Year Flood Event

	Estimated Acreage in 2000	Estimated Acreage in 2100	Percent Change
Coast:	13,640	18,770	+27%



disclaimer

TEMPERATURE: EXTREME HEAT TOOL

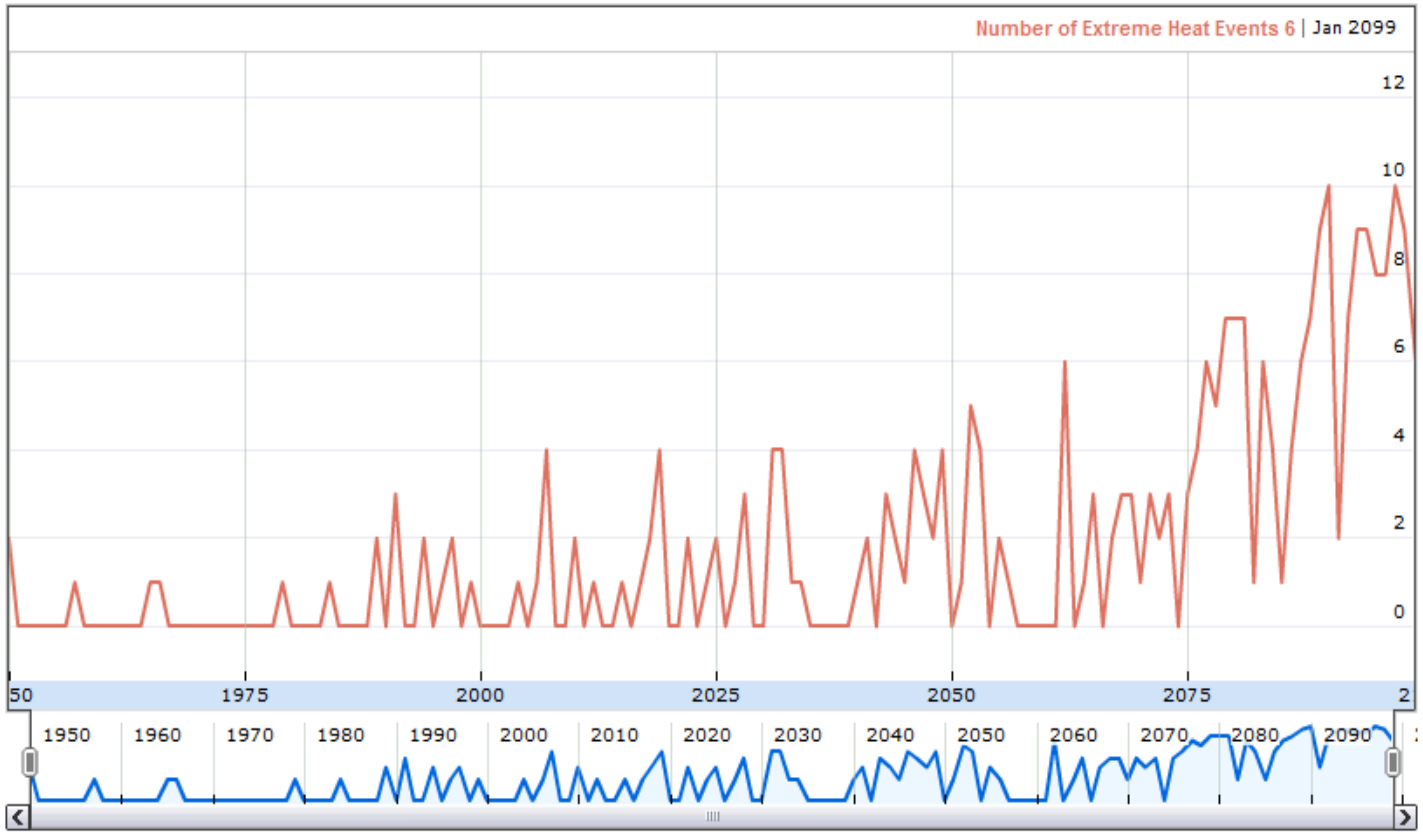
Burbank, CA

Emissions Scenario: LOW HIGH

ABOUT THE TOOL | GRAPH IT! | DISCLAIMER

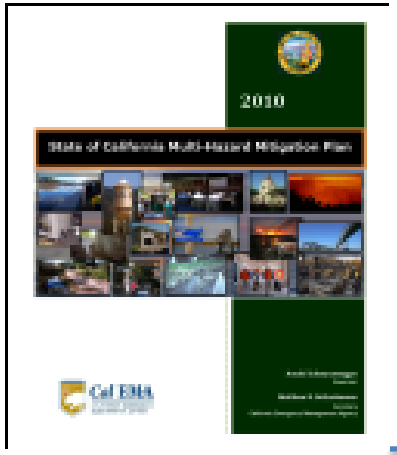
Timing of Extreme Heat Days by Year

OPTIONS



Historical Avg. # Extreme Heat Days: 4 | Extreme Heat Day Threshold: 105°F | *All values based on modeled data*

Bridging the Gap Between State and Local Planning:

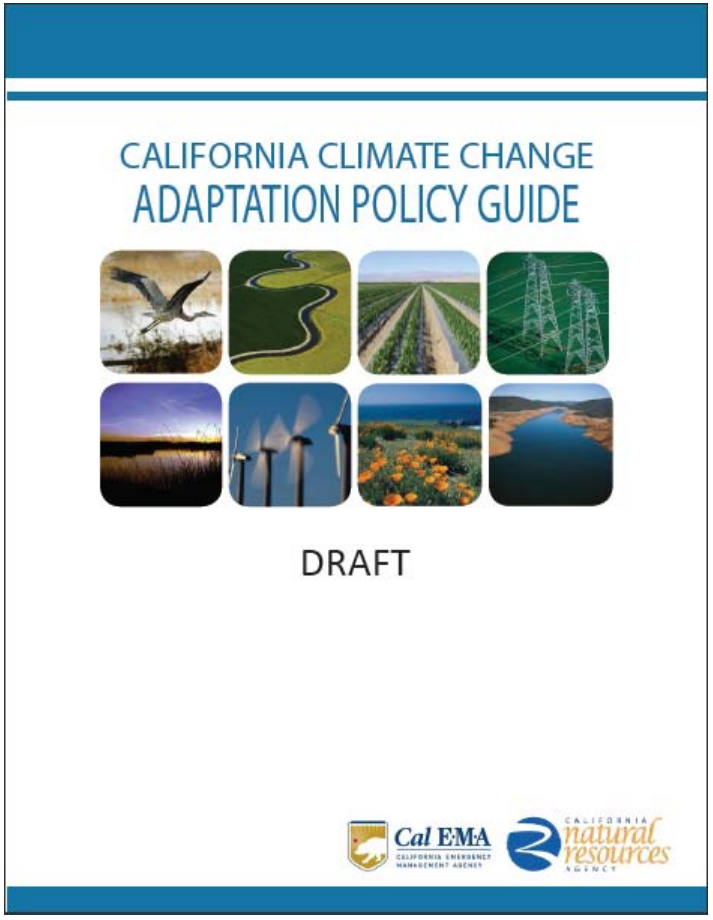


Policy guidance → **Local Adaptation Planning**

Second: once impacts are understood, provide guidance to help evaluate vulnerabilities and develop strategies to address these impacts.

(2009 CAS Executive Summary Strategy #6, Comprehensive State Strategy 3a)

Adaptation Policy Guide



- **A planning/decision framework**

***Timeline*:**

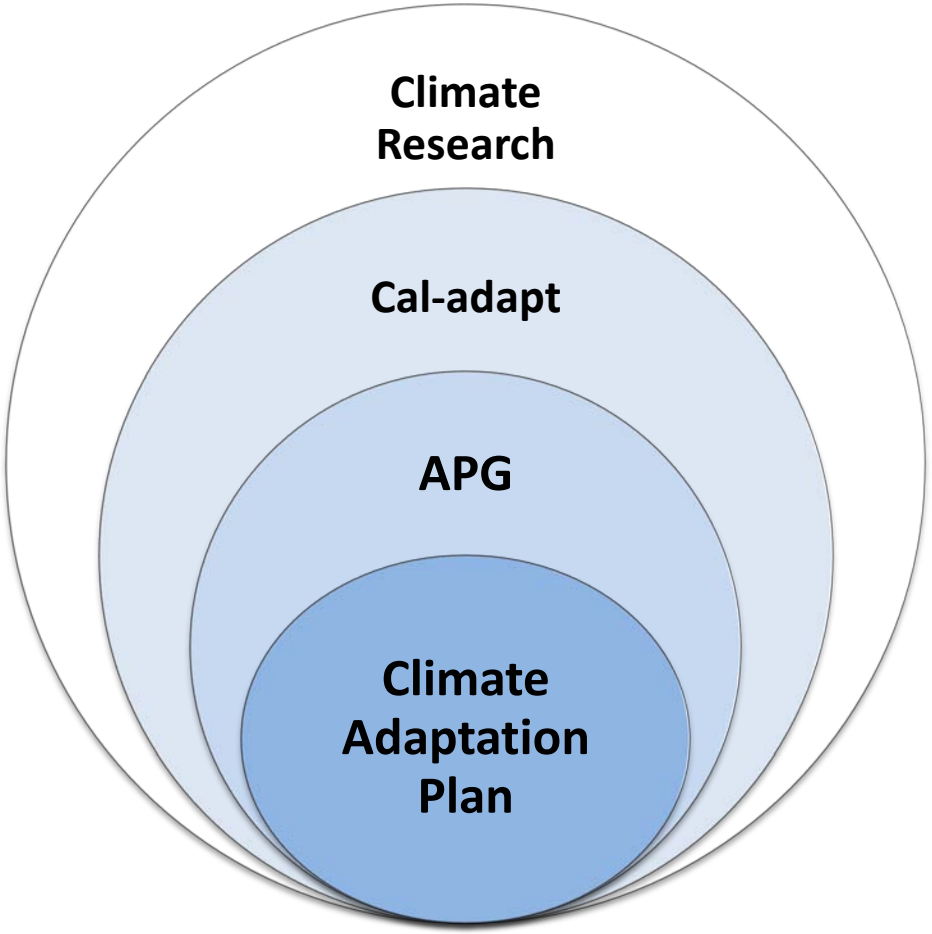
November 2010 – April 2012: Contracting and production

April 9, 2012: Draft released as part of Governor's Extreme Events Conference, Local Government Side Event

April 9 – June 8, 2012: Public Review

Final: End of June 2012

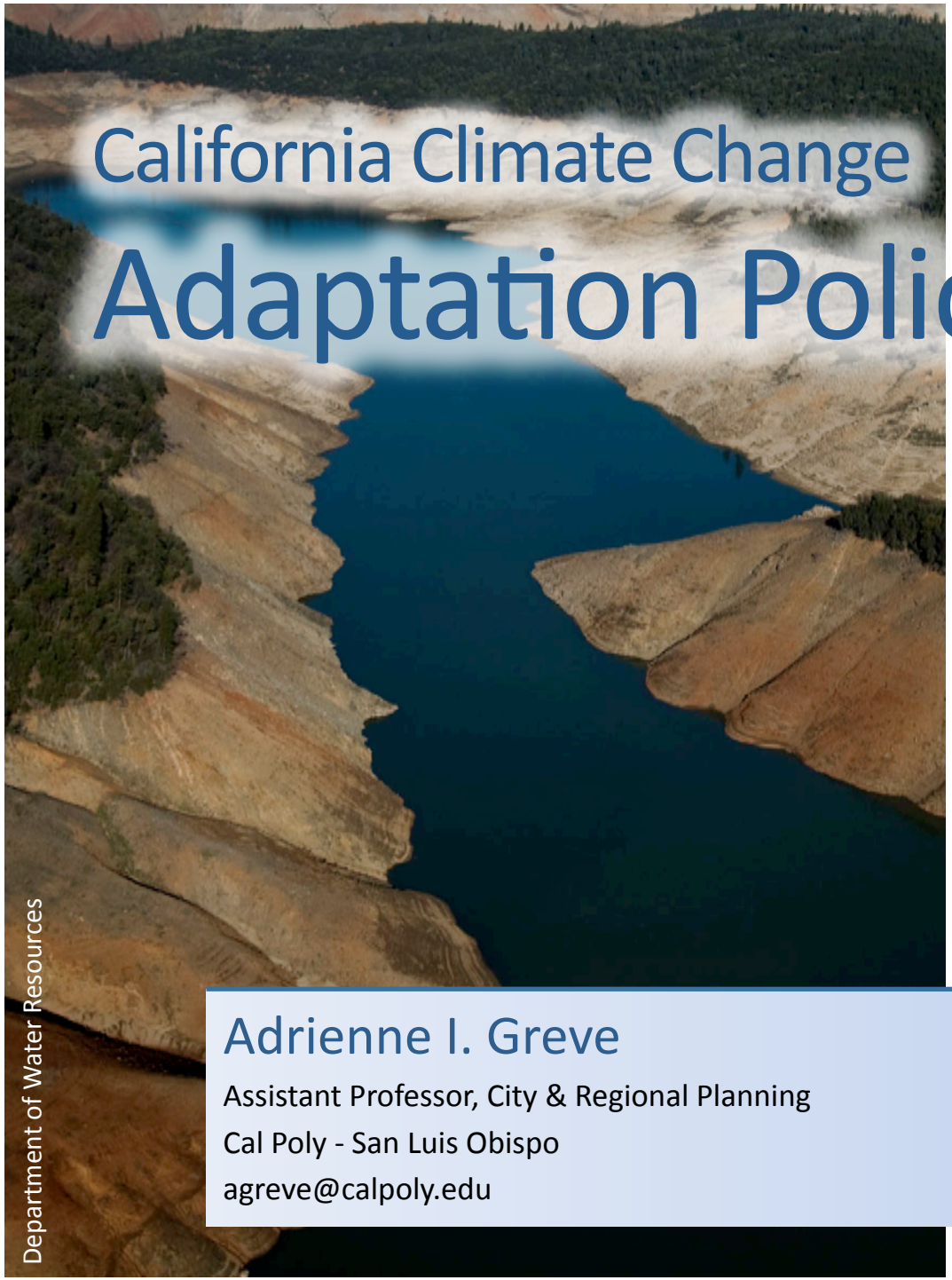
From science to planning:



Additional research, tools and guidance applicable to community needs

Thank you

resources.ca.gov/climate_adaptation/local_government/adaptation_policy_guide.html



California Climate Change Adaptation Policy Guide

Department of Water Resources

Cal EMA
CALIFORNIA EMERGENCY MANAGEMENT AGENCY

CALIFORNIA natural resources AGENCY

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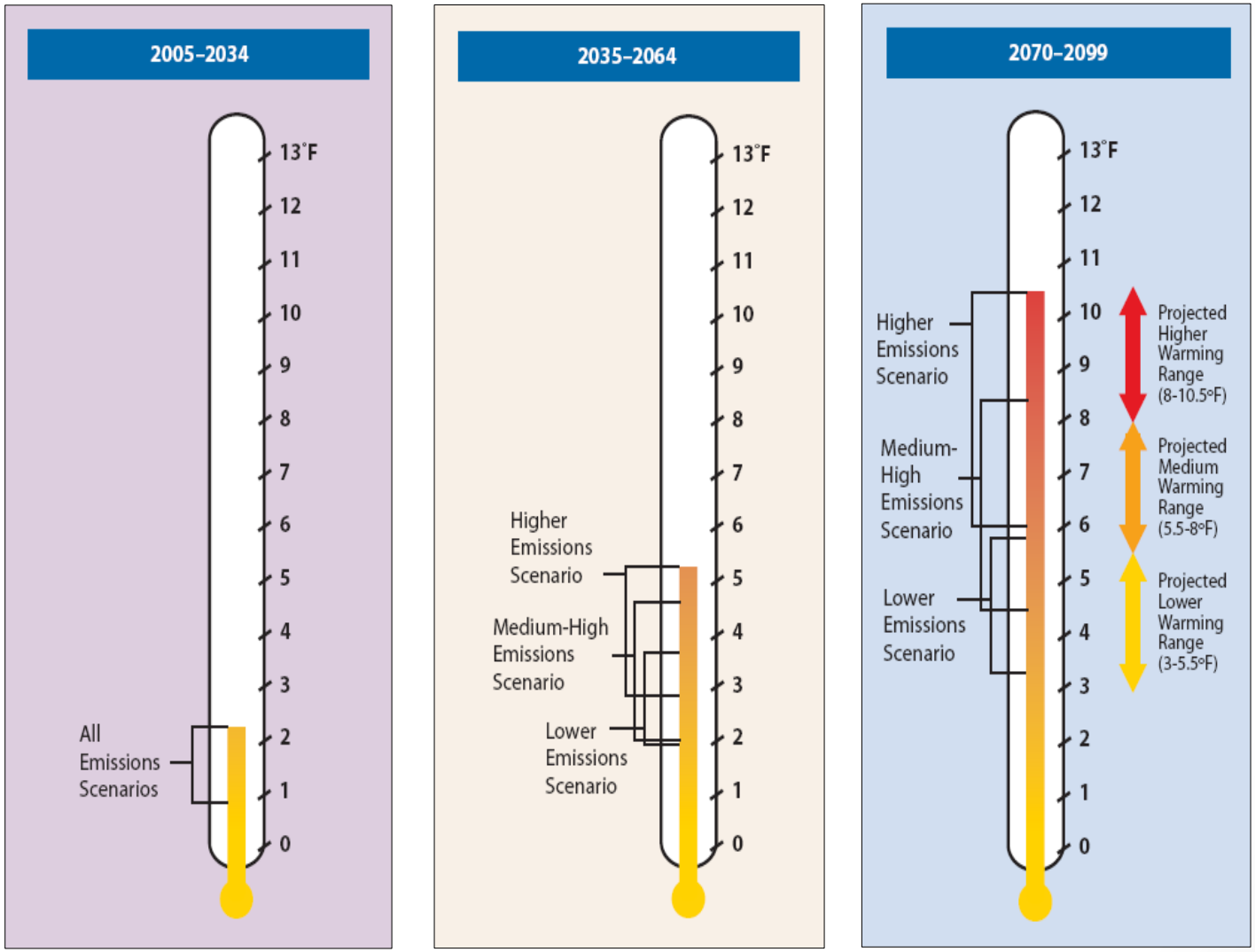
Why Climate Adaptation?



California Climate Change Center 2006

Climate Adaptation & GHG Reduction

Greenhouse Gas Reduction

Appliance trade-in
Efficiency incentive programs
Transit expansion
Bicycle infrastructure expansion
Pedestrian infrastructure
Parking policy
Increased solid waste diversion rate
Composting programs
Renewable energy generation
Energy efficiency standards
Car share programs
Bike share programs
Carbon tax
Fleet vehicle conversion
Mixed use development
Increased residential density
Carpool programs
Green business certifications
Establish growth boundaries

Passive cooling systems
Urban heat island mitigation
Wetland restoration
Urban forest management
Reflective roofing & paving
Stormwater management
Green infrastructure
Permeable paving
Planting lists
Green roof programs
Power plant upgrades
Public education
Water recycling
Energy demand management
Improved energy efficiency
Tiered pricing
Green building requirements
Weatherization programs
Community gardening

Adaptation

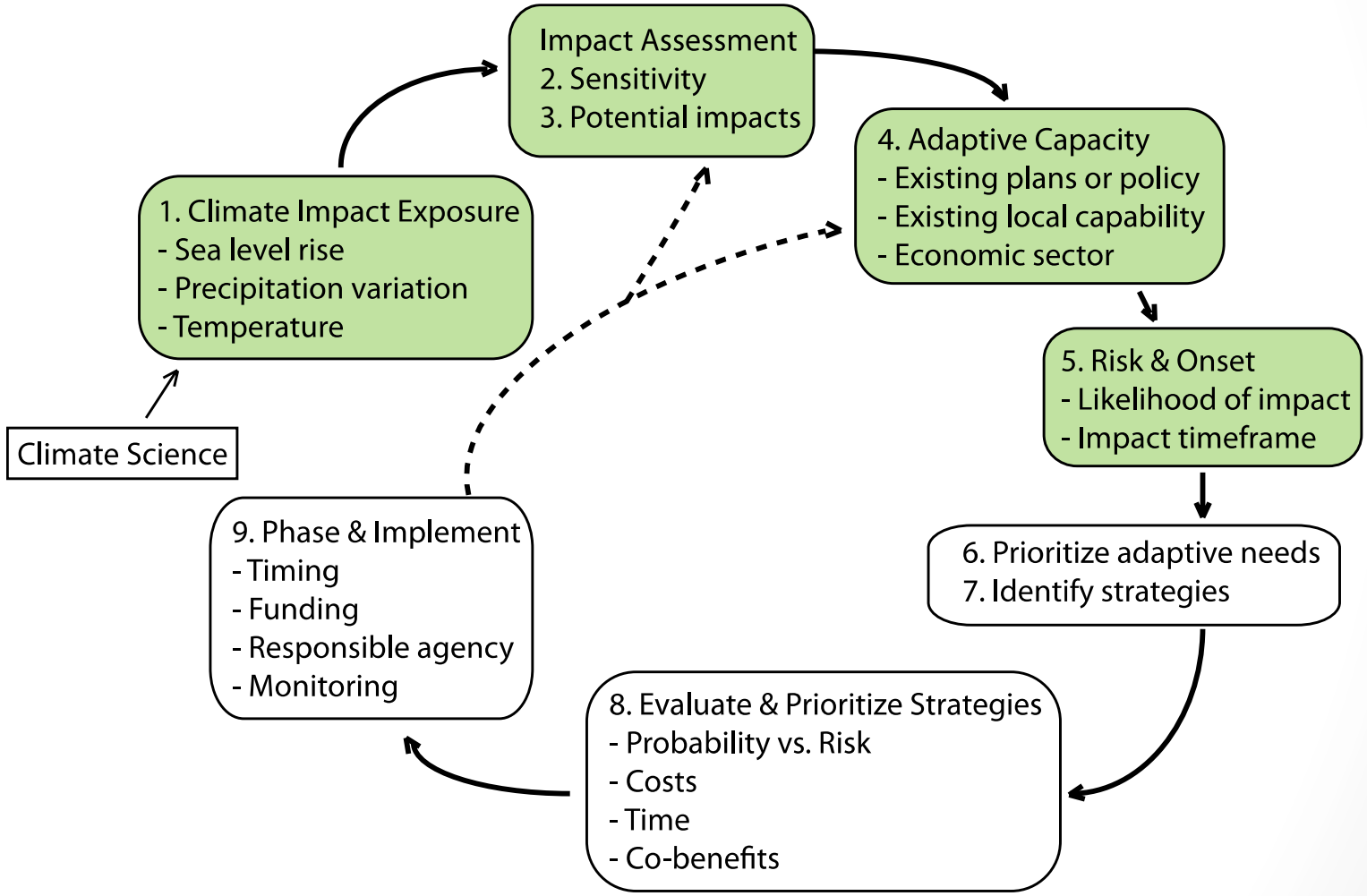
Heat response plans
Flooding response plan
Managed retreat
Sea level rise plan
Desalinization
Air quality notification system
Watershed evaluation
Mosquito control
Water & air quality monitoring
Ecosystem diversity assessment
Establish cooling centers
Economic diversification
Defensible space policy for fire
Migration corridor development
Utility burial
Retrofit for flood resistance
Increase emergency services
Reinforce critical infrastructure
Update evacuation plans

Moser, 2011; Boswell, Greve, & Seale (*2012*)

Adaptation & Local Jurisdictions

- Diversity
  - Biophysical Setting
  - Jurisdiction Characteristics
  - Social/Political Feasibility
- Jurisdiction Control
- Scale (impacts & solutions)
- Uncertainty
  - Climate impact projections
  - Spatial resolution
  - Anticipated outcomes
- Cross sector impacts & solutions
- Links to other guidance

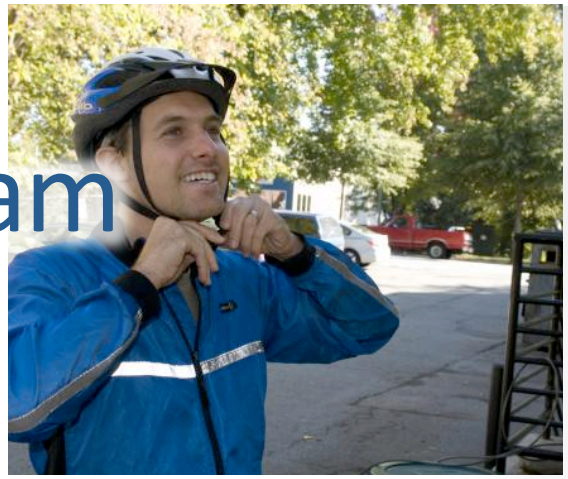
Adaptation Policy Development



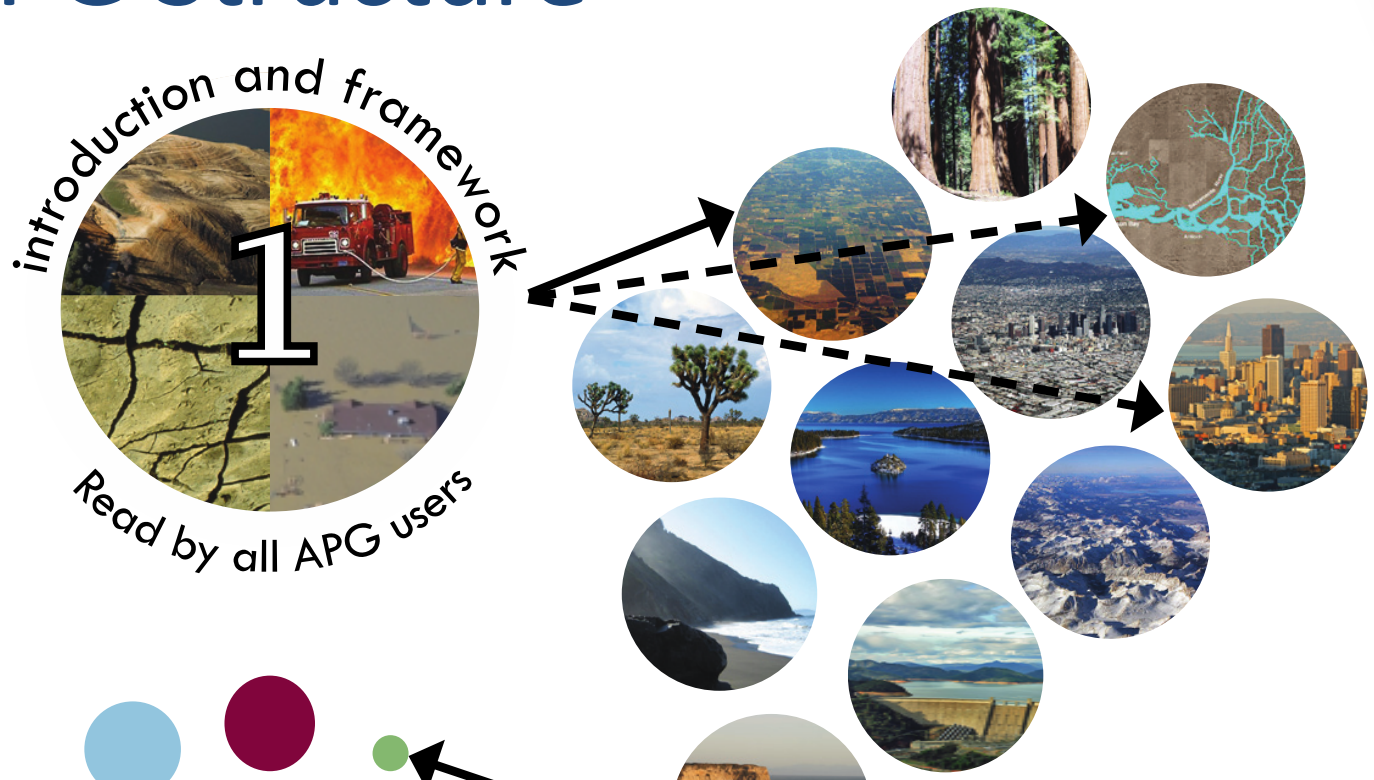
Adapted from Boswell, Greve, & Seale, 2012

Climate Adaptation Team

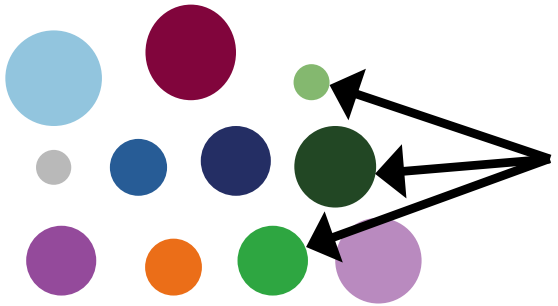
- Long-range planning or community development
- Emergency response and natural hazards planning
- Economic development
- Parks and open space
- Transportation or engineering
- Utilities (water, wastewater, etc.)
- Administration/finance
- Chamber of commerce
- Public health
- Social services
- Local non-governmental organizations (NGOs - environmental, social, etc)
- Professional organizations (agricultural, fisheries, communications, etc.)



APG Structure



2 APG users review the region(s) most relevant to their community.



3 Finally, APG users select strategies to address adaptation needs.

Seven Sectors

- Equity, Health, and Socio-economic Impacts
- Oceans and Coastal Resources
- Water Management
- Forestry and Rangeland
- Biodiversity and Habitat
- Agriculture
- Infrastructure

Eleven Climate Adaptation Regions

North Coast Region

North Region

Bay Area Region

Northern Central Valley Region

Bay-Delta Region

Southern Central Valley Region

Central Coast Region

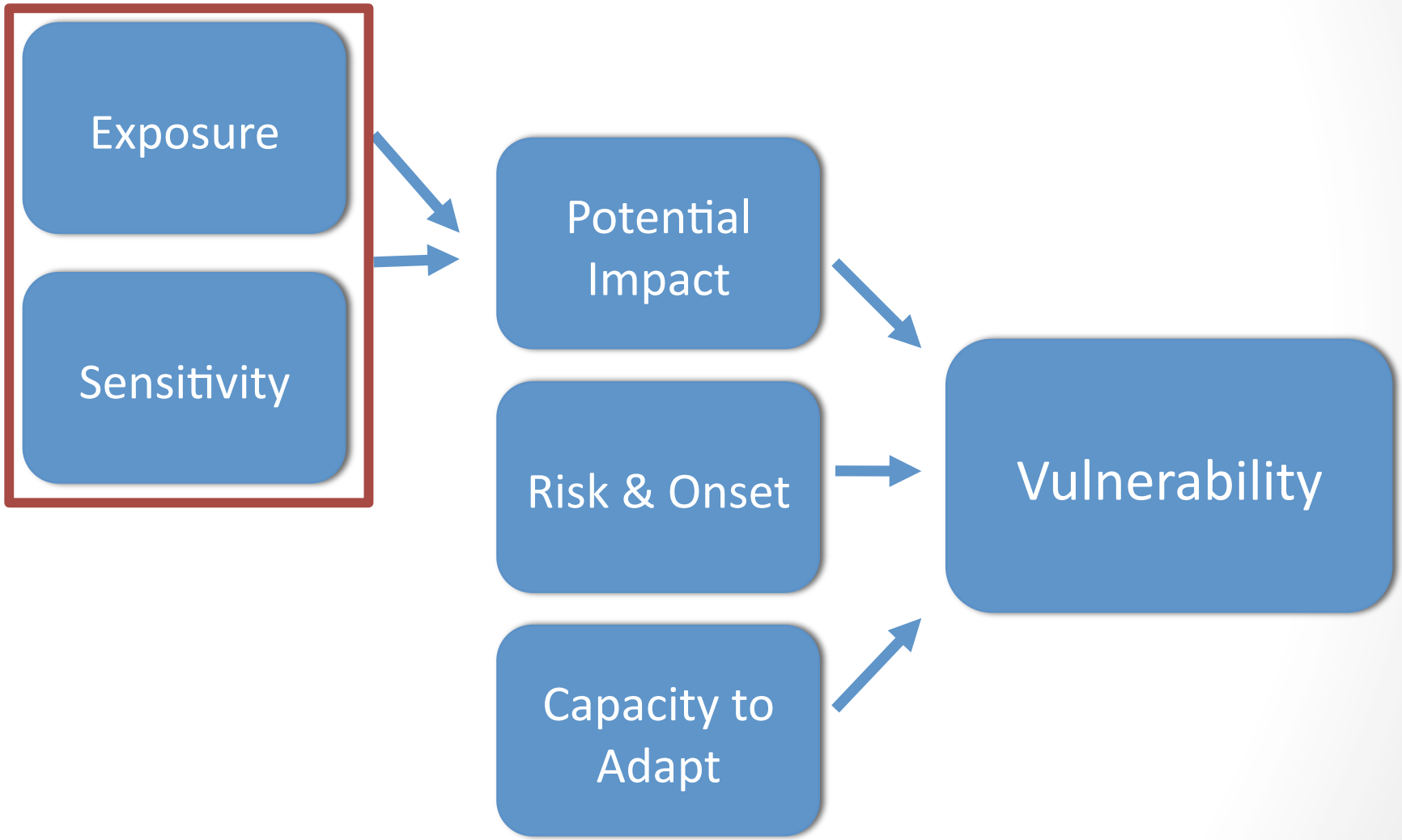
North Sierra Region

Southeast Sierra Region

South Coast Region

Desert

Vulnerability Assessment



Exposure

Projected climate impacts

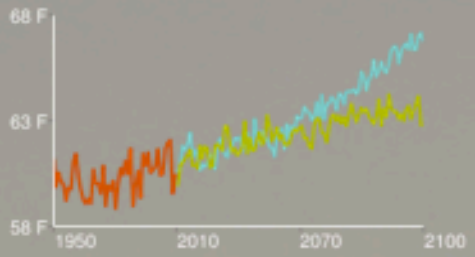
- Difference from current conditions
- Speed of onset
- Spatial variation
- Extent of impact
- Certainty

cal-adapt

EXPLORING CALIFORNIA'S CLIMATE CHANGE RESEARCH

View Local Profiles

QUICKLY EXPLORE CLIMATE PROJECTIONS FOR YOUR LOCAL AREA



Explore Climate Tools

INTERACTIVE MAPS & CHARTS

SEA LEVEL RISE

About Cal-Adapt

- WHAT'S NEW?
- WHAT'S TO COME?
- FAQS

Access Data

ACCESS THE RAW DATA USED IN CAL-ADAPT

Select and download data in a variety of tabular and GIS formats

Resources

INFORMATION, ARTICLES & LINKS

Find out more about how climate change in California is relevant to your community

Community

PARTICIPATE IN COMMUNITY BASED TOOLS AND ACTIVITIES

Find out how you can share your thoughts and findings, communicate with experts, and help to collect new data

Tweet 201 Like 349

Site developed by:
Geospatial Innovation Facility

Cal-Adapt is a product of the Public Interest Energy Research (PIER) program

Estimating Exposure

- *Sea-level rise*: Identify areas of the community that are currently subject to coastal flooding (100-year flood) and areas potentially subject to the 55-inch rise forecasted for 2100.
- *Precipitation*: Identify the current annual precipitation and the forecasted change over time to 2090.
- *Temperature*: Identify the current average seasonal temperatures and the forecasted change over time to 2100.

Impact Certainty (IPCC

Driver	% Prob. Of Driver (IPCC)	Certainty
Temperature change	> 90% probability	High
Precipitation change	> 66% probability	Medium
Sea-level rise	>90% probability	High
Snow season and depth change	> 90% probability	High

Source: IPCC. 2007. WG1 Physical Science Basis, Section 10 & 11.

Sensitivity

2. ASSETS

Residential
Commercial
Industrial
Government
Institutional (schools, churches, hospitals, prisons, etc.)
Parks & open space
Recreational facilities
Infrastructure
Water treatment plant and delivery infrastructure
Wastewater treatment plant and collection infrastructure

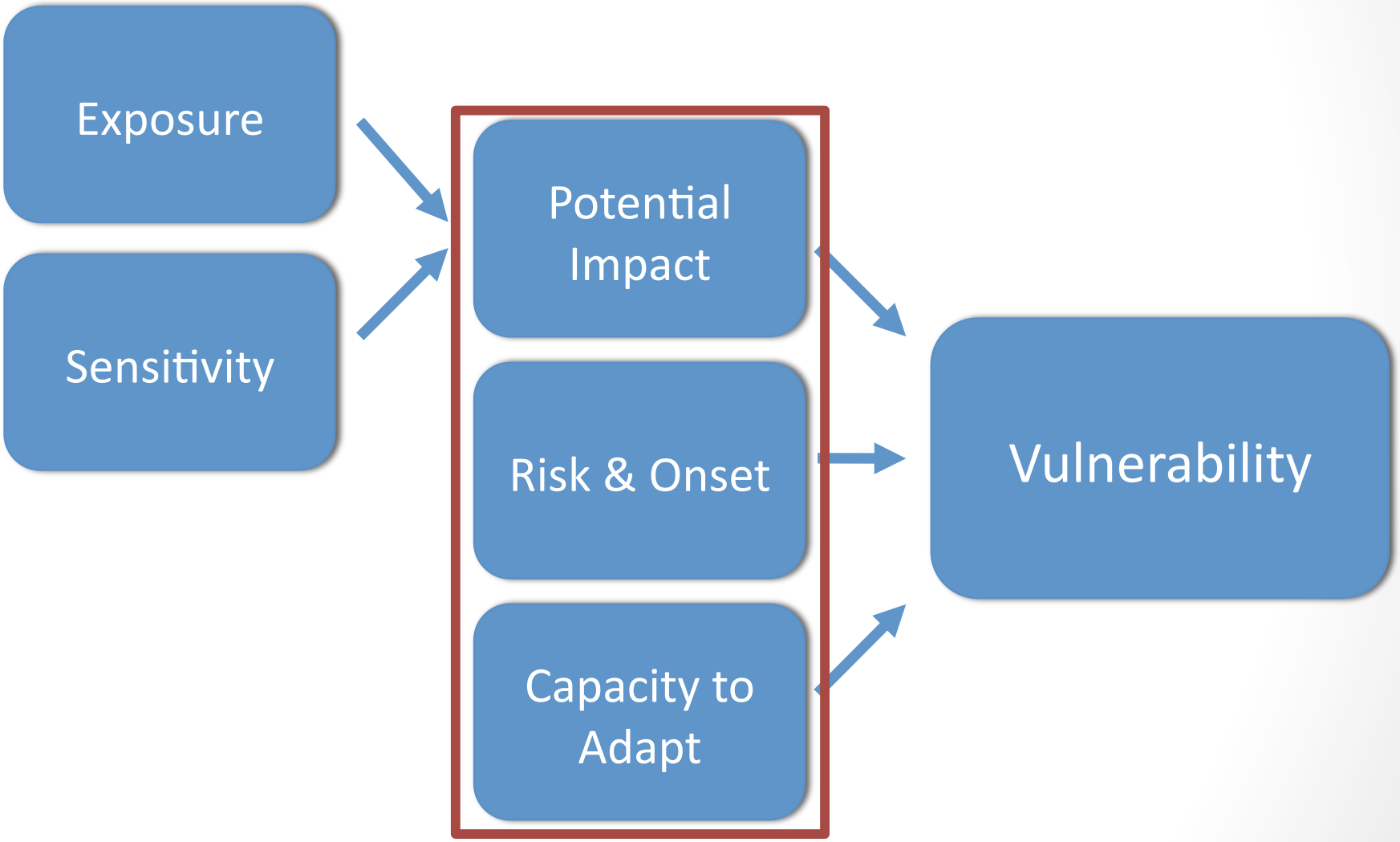
1. FUNCTIONS

Government continuity
Water/sewer/solid waste Energy delivery
Emergency services
Public safety
Public health
Emotional and mental health
Business continuity
Housing access
Employment and job access
Food security
Mobility/transportation/access
Quality of life
Social services
Ecological function
Tourism
Recreation
Agriculture, forest, and fishery productivity
Industrial operations

3. POPULATIONS

Seniors
Children
Individuals with disabilities
Individuals with compromised immune systems
Individuals without access to cars
Non-white communities
Low-income communities
Renters

Vulnerability Assessment



CalEMA, CNRA – APG Draft 2012

Potential Impact

For each point of sensitivity identify:

- Temporal extent
- Spatial extent
- Permanence
- Danger to local populations
- Level of disruption to normal community function

Risk and Onset

Secondary Exposure	Driver Occurs?	Certainty*
Inundation/long-term waterline change	↑ sea-level	High
Extreme high tide	↑ sea level	High
Coastal erosion	↑ sea level	High
Salt water intrusion	↑ sea level	High
Changed seasonal patterns	↑ or ↓precipitation-and/or-↑ or ↓ temperature	Medium
Heat wave	↑ temperature	High
Intense rainstorms	↑ temperature-and/or- ↑ or ↓precipitation	Medium
Landslide	↑ wildfire-and/or- ↑ precipitation	Medium
Drought	↑ temperature-and/or- ↓precipitation	Medium
Wildfire	Use Cal-Adapt	Medium
Snowpack	Use Cal-Adapt	High

Estimated based on most conservative driver from Table 2.
Source: IPCC. 2007. WG1 Physical Science Basis, Section 10 & 11.

Adaptive Capacity

Current capacity to adapt to projected changes

Plans

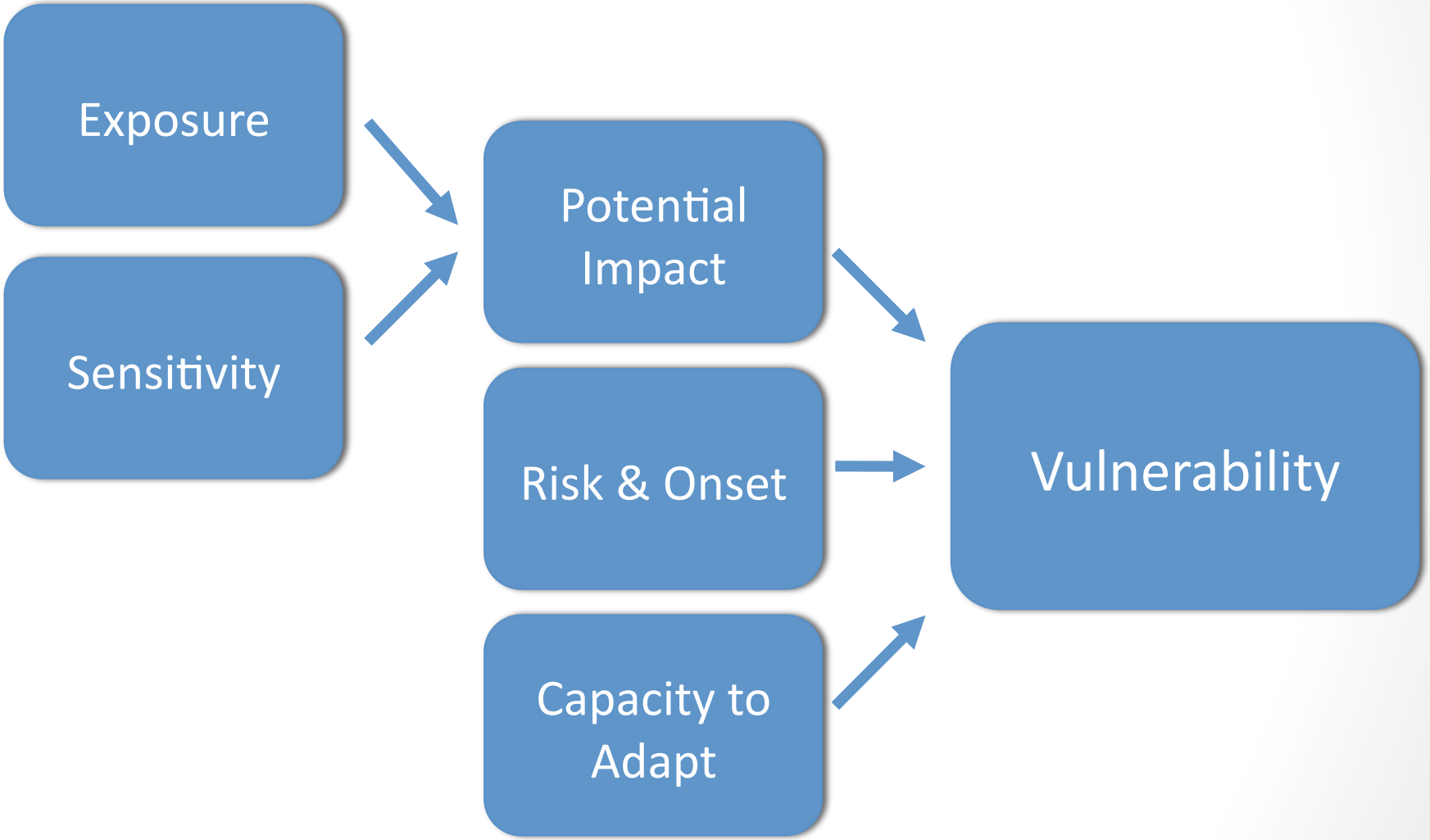
General Plan
Area and Specific Plans
Local Hazard Mitigation Plan
Transit Plan
Urban Water Management Plan
Parks, Trails, and Open Space Master Plan
Downtown Plan

Standards, Ordinances, Programs, And Policies

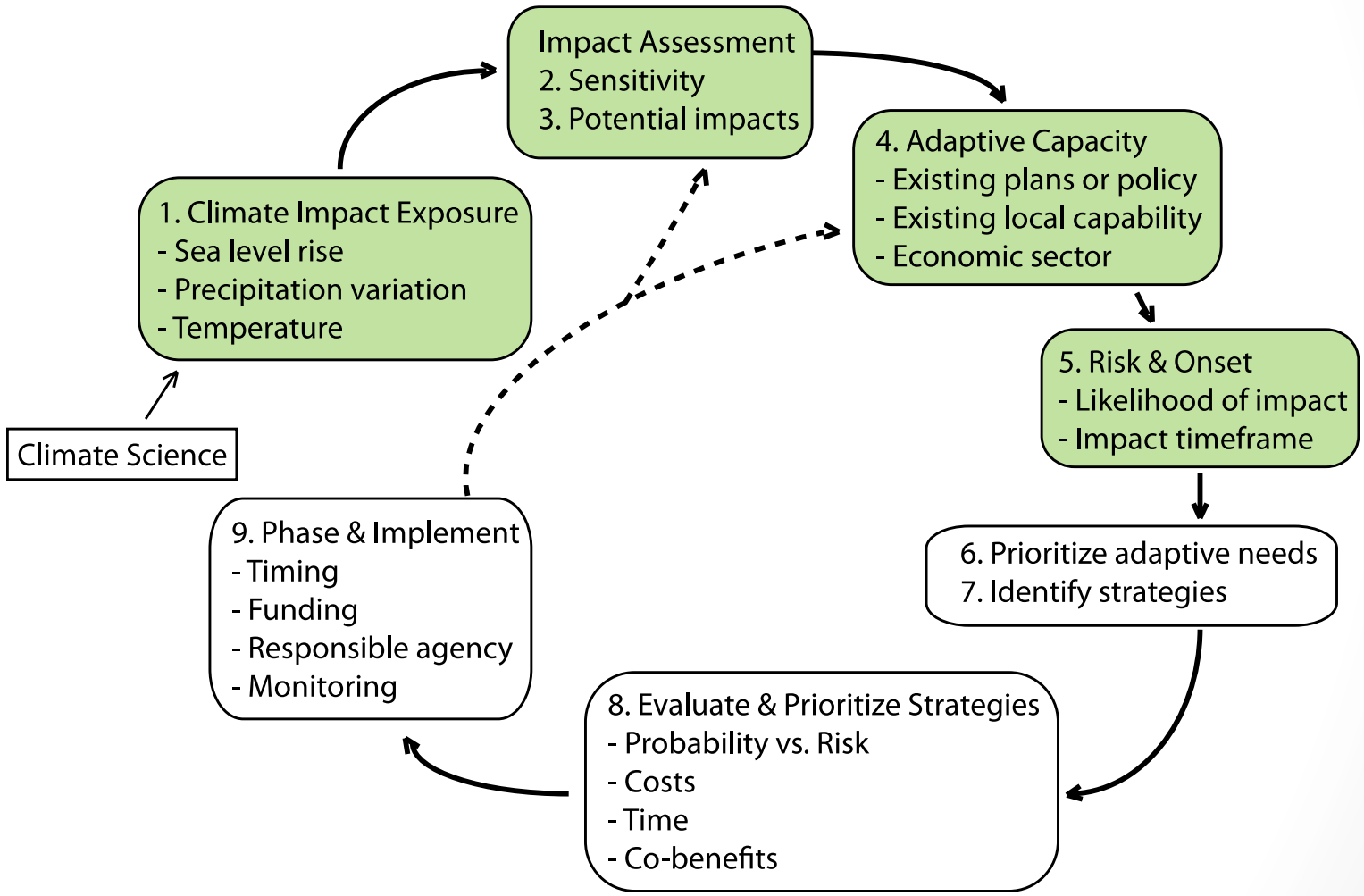
Stormwater Management Program
Zoning Code
Building Code
Fire Code
Tree Ordinance
Floodplain Ordinance

- For each identified potential impact:
  - Identify actions in progress, planned, or readily implemented to address it.
  - If not yet implemented, evaluate the time and resources needed for implementation.
  - Note the degree to which existing actions could be strengthened.

Vulnerability



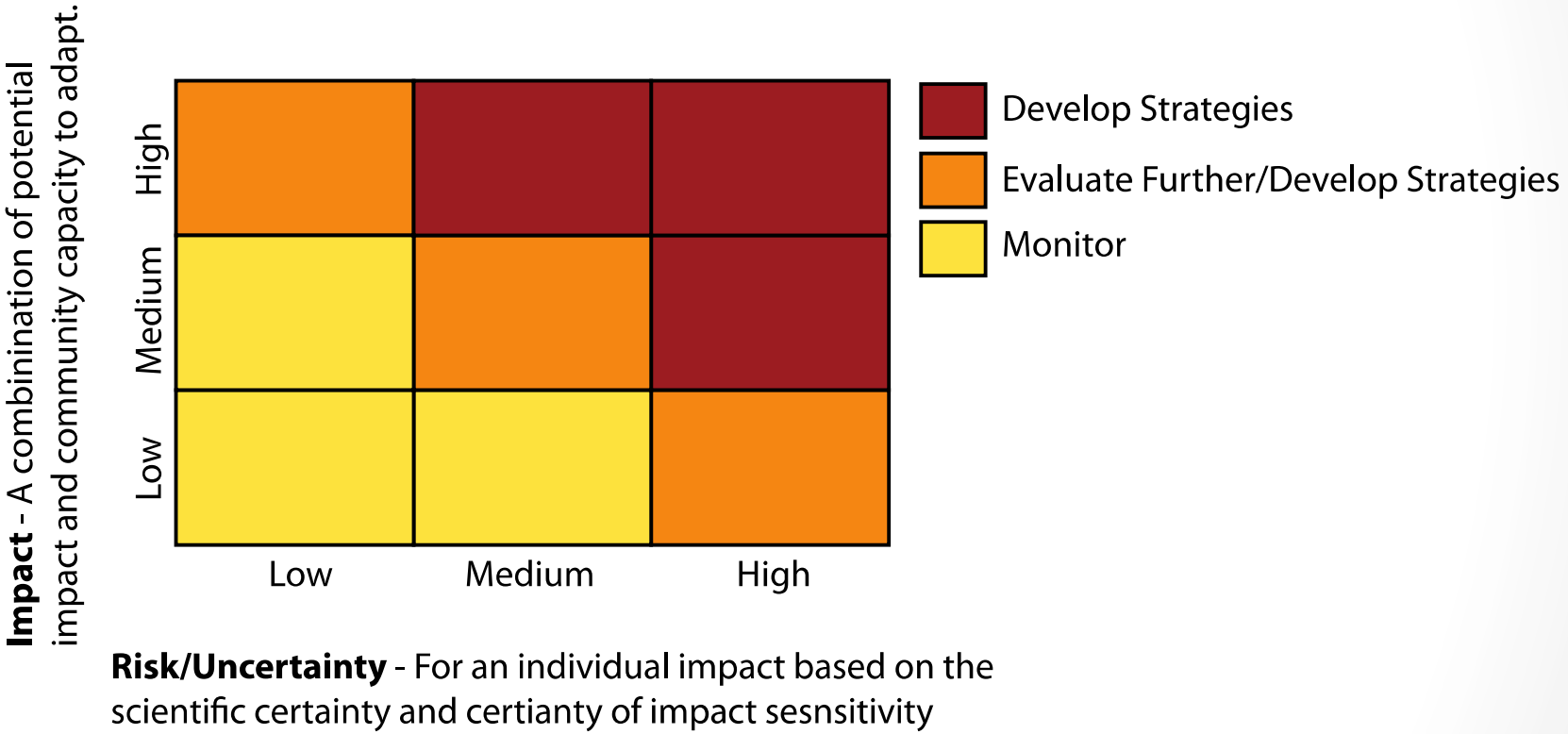
Adaptation Policy Guide



Adapted from Boswell, Greve, & Seale, 2012

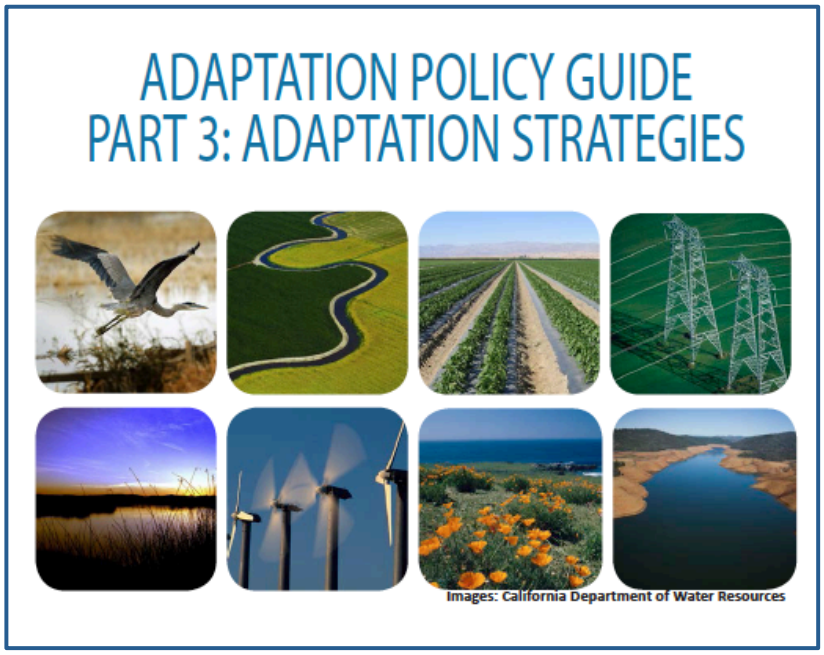
Prioritizing Adaptive Needs

Policy in the Face of Uncertainty



Adapted from City of New York, 2009

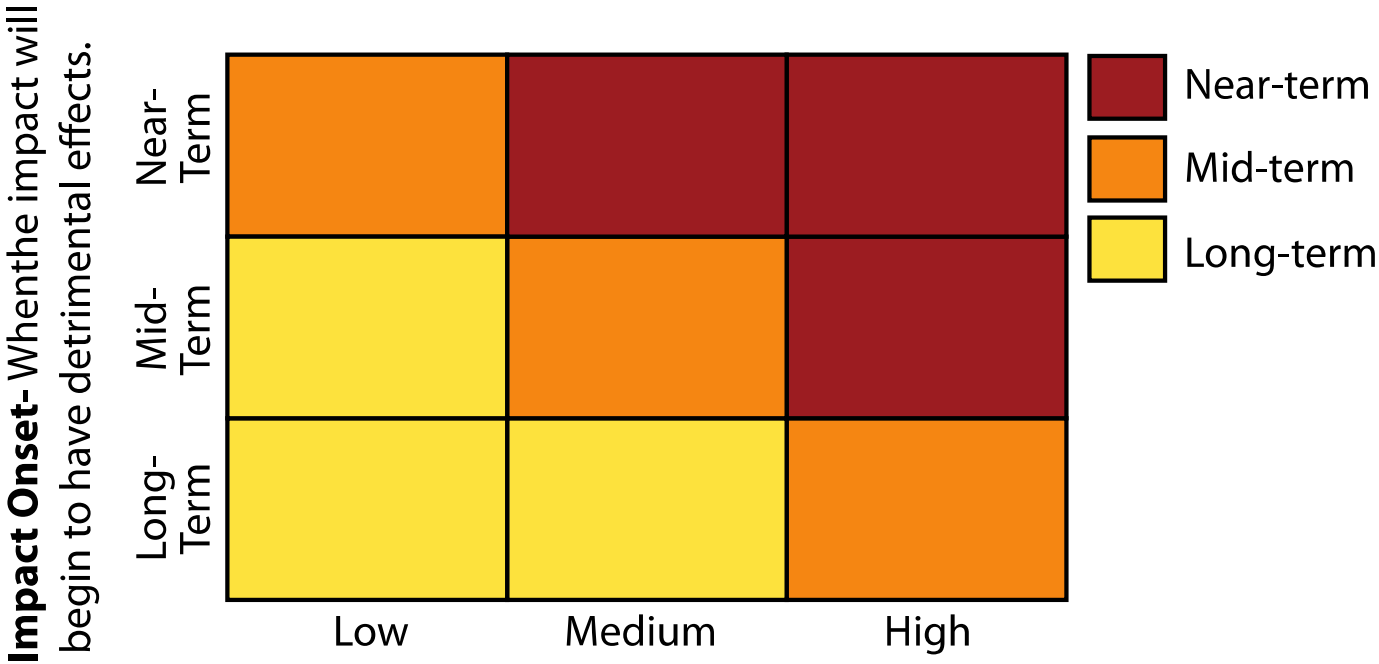
Identify Strategies



Part 3: Adaptation Strategies

- Description
- Factors to Consider
- Examples of Application
- Sources of Information
- Funding
- Sector overlap

Prioritizing Strategies



Cost - Ease of obtaining funding

Co-benefits - Benefit to the community beyond adaptation

Duration - Ease of implementation (from the perspective of time)

Social - Level of community &/or political support

Adapted from City of New York, 2009

Thank You!

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